

REMARKS

At the time of the Office Action dated April 24, 2006, claims 5, 6 and 11-28 were pending in this application. Of those claims, claims 16-26 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. §1.142(b).

In this Amendment, claims 6, 12, 13 and 15 have been amended, and claims 5, 11, 14, 27 and 28 canceled. Care has been exercised to avoid the introduction of new matter. Specifically, independent claims 6 and 12 have been amended to include part of limitations recited in claim 5, and claim 13 has been amended to delete the recitation “either in the proximity of an upper surface.” Claim 15 has been amended for better form.

Now, claims 6, 12, 13 and 15 are active in this application.

Claim Objections

The Examiner proposed to amend claim 15 as follows: “the semiconductor device as set forth in claim 13, **further comprising** a metal interconnect...” (emphasis original). In response, Applicant has amended claim 15 in a manner proposed by the Examiner. Withdrawal of this objection is, therefore, respectfully solicited.

Claims 5, 13 and 14 have been rejected under 35 U.S.C. §102(b) as being anticipated by Gnade et al.

In the statement of the rejection, the Examiner asserted that Gnade et al. disclose a method for forming porous composites as a low dielectric constant layer with varying porosity distribution electronics applications, identically corresponding to what is claimed. It is noted that the rejection of claims 5 and 14 has been rendered moot by cancellation of these claims.

Applicant submits that Gnade et al. do not disclose a semiconductor device including all the limitations recited in claim 13. Specifically, the reference does not disclose, among other things, that “pores in said porous portion are distributed in a relatively lower density in the proximity of a lower surface of the dielectric film,” recited in claim 13 (emphasis added).

Gnade et al. disclose a dielectric film where pores are distributed in a relatively lower density in the proximity of an upper surface of a dielectric film. However, Gnade et al. do not disclose or suggest a dielectric film where pores are distributed in a relatively lower density in the proximity of a lower surface of a dielectric film, as claimed. Claim 13 has been amended to not to recite pores in the porous portion are distributed in a relatively lower density in the proximity of an upper surface of the dielectric film.

Accordingly, Gnade et al. do not disclose a semiconductor device including all the limitations recited in claim 13. Applicant, therefore, respectfully solicits withdrawal of the rejection of claim 13 under 35 U.S.C. §102(b), and favorable consideration thereof.

Claims 6, 12, 27 and 28 have been rejected under 35 U.S.C. §102(e) as being anticipated by Xia et al.

In the statement of the rejection, the Examiner asserted that a method for depositing a low K dielectric film ($k > 3.5$) for a hard mask application, identically corresponding to what is claimed. It is noted that the rejection of claims 27 and 28 has been rendered moot by cancellation of the claims.

Applicant submits that Xia et al. do not disclose a semiconductor device including all the limitations recited in claims 6 and 12, as amended. Specifically, the reference does not disclose, at minimum, “an area where density of said pores varies gradually toward the upper surface of

said dielectric film,” recited in claims 6 and 12. In comparison with a dielectric film comprising a porous film with uniform pore distribution and a non-porous film in contact with the porous film, the claimed dielectric film is unique in that both strength and adhesion are improved.

Xia et al. disclose low k dielectric layer 102 and silicon oxycarbide hardmask layer 104 which is in contact with the low k dielectric layer 102 (see Fig. 1E). However, the combination of low k dielectric layer 102 and silicon oxycarbide hardmask layer 104 does not disclose or teach a dielectric film which includes an area where density of the pores varies gradually toward the upper surface of the dielectric film.

Accordingly, Xia et al. do not disclose a semiconductor device including all the limitations recited in claims 6 and 12. Applicant, therefore, respectfully solicits withdrawal of the rejection of claims 6 and 12 under 35 U.S.C. §102(e), and favorable consideration thereof.

Claims 6 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Forbes et al. in view of Xia et al.

In response, Applicant submits that the applied combination of Forbes et al. and Xia et al. does not teach a semiconductor device including all the limitations recited in claim 6. As the reason set forth above, Xia et al. does not disclose, at minimum, “an area where density of said pores varies gradually toward the upper surface of said dielectric film,” recited in claim 6. Forbes et al. does not teach the claimed area where density of the pores varies gradually toward the upper surface of the dielectric film, either, as Applicant argued in the March 16, 2006 response. Moreover, Forbes et al. and Xia et al. do not disclose or suggest improving strength and adhesion at the same time.

Accordingly, the applied combination of Forbes et al. and Xia et al. does not teach a semiconductor device including all the limitations recited in claim 6. Applicant, therefore, respectfully solicits withdrawal of the rejection of claim 6 under 35 U.S.C. §103, and favorable consideration thereof.

Claim 11 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Gnade et al. in view of Xia et al.

It is noted that the rejection of claim 11 has been rendered moot by cancellation of the claim 11.

Claim 15 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Gnade et al. in view of Xia et al.

Applicant submits that claim 15 is patentably distinguishable over Gnade et al. and Xia et al. at least because the claim includes all the limitations recited in independent claim 13. Xia et al. do not teach, at minimum, that “pores in said porous portion are distributed in a relatively lower density in the proximity of a lower surface of the dielectric film,” recited in independent claim 13, and do not cure the deficiencies of Gnade et al.

Accordingly, the applied combination of Gnade et al. and Xia et al. does not teach a semiconductor device including all the limitations recited in claim 15. Applicant, therefore, respectfully solicits withdrawal of the rejection of the rejection of claim 15 under 35 U.S.C. §103, and favorable consideration thereof.

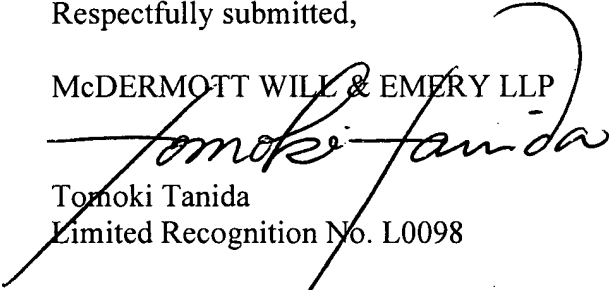
Conclusion

It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Date: July 24, 2006